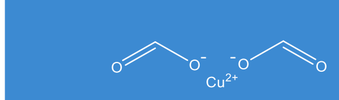
# From the synthesis of Cu nanocrystals to the formation of conductive layers

Arnau Oliva Puigdomènech, Filip Geenen, Christophe Detavernier, Zeger Hens

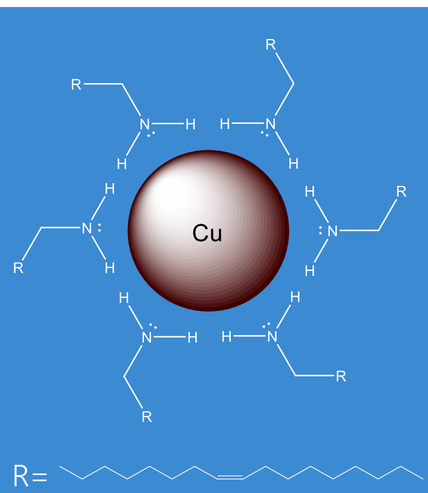
Due to its intricate processing, copper is still far from replacing silver in conductive printed electronics. In this comprehensive study, from synthesis to final conductive layers, we demonstrate the feasibility to produce cost-effective copper-based conductive inks.

## Copper nanocrystals synthesis



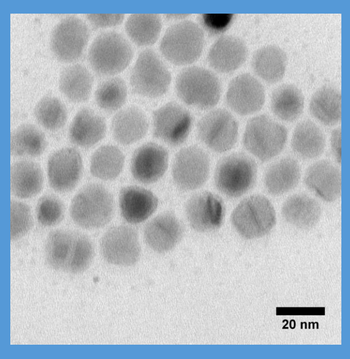


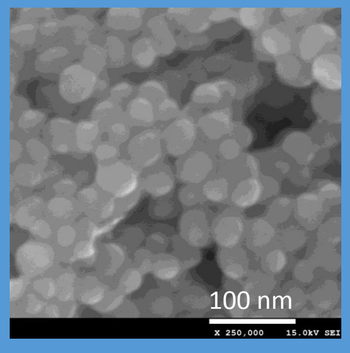
140 °C

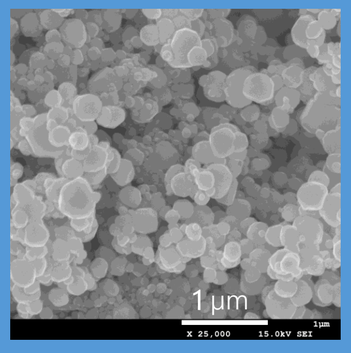



## Size and composition analysis

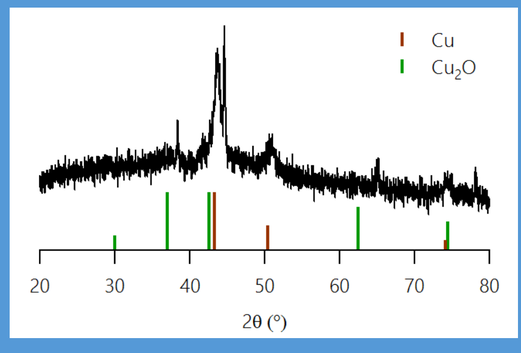
Particle size can be adjusted from 15 to 200 nm depending on the desired properties and application




Metallic particles are produced in the synthesis

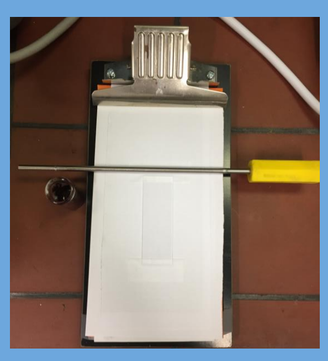



## Ink formulation and printing

Ink formulation

- Copper Nanocrystals (50%)
- Solvent (46%)
- Additives (4%)
  - Binder
  - Stabilizer
  - Wetting agent

Layer formation



Manual k-bar application

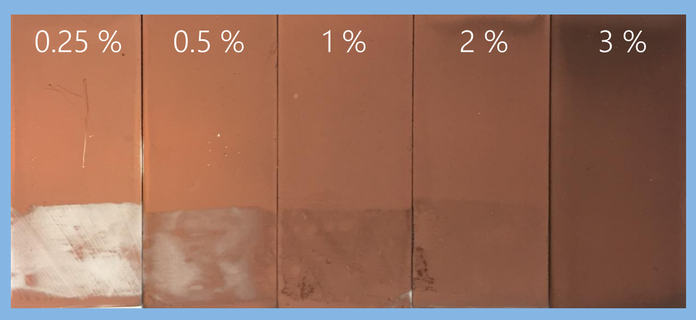
Thermal sintering in $N_2$ at 400°C

Before

After

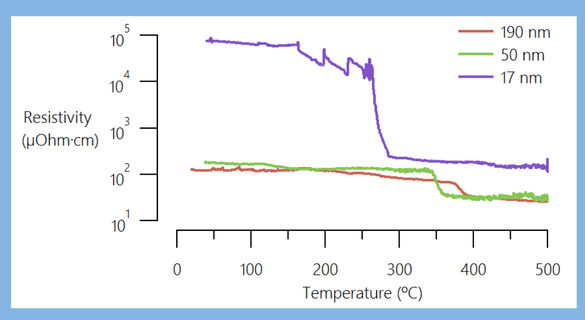
## Adhesion and conductivity tests

Effect of binder concentration on adhesion




Scotch tape test

In-situ monitoring of resistivity during sintering




Larger particles require more energy to sinter yet are more conductive than the smaller

Resistivity: ≥23 µΩ·cm,
7% of bulk copper conductivity

CoCooN
Conformal Coating of Nanomaterials

PCN

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